MICHIGAN WATER RESOURCES COMMISSION
BUREAU OF WATER MANAGEMENT
DEPARTMENT OF NATURAL RESOURCES

Report of an Industrial Wastewater Survey
Conducted at
MICHIGAN STANDARD ALLOYS, INC.
Zinc Division
City of Benton Harbor
Berrien County
March 26, 27 & 28, 1973

Purpose of Survey

On Monday, March 26, 1973, members of the Michigan Water Resources Commission staff began conducting the first of two consecutive 24-hour wastewater surveys at the Zinc Division Plant of Michigan Standard Alloys, Inc. The purpose of these surveys was to determine the quality and quantity of industrial wastewater being discharged into Ox Creek by way of the Benton Harbor storm sewer system.

Summary of Survey

The results of this survey show that an average of 13,500 gallons per day of cooling wastewaters are being discharged into Ox Creek. The discharge contained fluorides (1.8 mg/l), zinc (3.6 mg/l), suspended solids (37 mg/l) and oil (32 mg/l) in the different 24-hour composite samples of their discharge.

Plant Processes, Sources of Wastewater and Disposal

The Zinc Division of Michigan Standard Alloys, Inc. receives scrap zinc and zinc alloys and refine it into a saleable product meeting selected specifications of their customers. Production is usually on a job-type basis with plant hours usually 8 hours a day. The primary water usage is for cooling the various furnaces used to melt and refine the alloys and some cooling of the finished product. These wastewaters are discharged untreated into a city storm sewer located on Hurd Street.

City water is used for all industrial supplies and potable supplies. The sanitary sewage from the plant employees enters the Benton Harbor sanitary sewer.

Survey Procedure and Results Obtained

The survey staff installed a 22-1/2 degree vee-notch weir in the storm sewer manhole, on Hurd Street, receiving the industrial wastewaters from Michigan Standard Alloys, Inc. This weir was equipped with a water level recorder and an automatic sampler. The recorder continuously measured the elevation of water passing over the weir providing a time-head curve from which the total flow during a survey could be computed (Table 1). The sampler operated in 10-minute intervals obtaining a proportional sample of the instantaneous flow over the weir. Each sample was deposited into a clean container making up a composite sample representative of the total discharge during a survey period.

The above procedure was carried out for two consecutive surveys of approximately 24 hours duration each. At the end of each survey, the composite samples were transported to the Bureau of Water Management laboratory in Lansing for selected physical and chemical quantitative analysis (Table 2).

During both surveys, grab samples were collected and composited periodically from the outfall for analysis not included in the composite samples. The constituents analyzed for, in each of the composite samples, and the method of sampling are given below. In all cases, the analyses were performed by the Bureau of Water Management laboratory. The results of these analyses can be found in the indicated tables.

1. Oils as hexane extractables - Individual grab samples were deposited into a clean container every four hours making up a grab composite over a 24-hour period for the second survey period only. The laboratory analyses are given in Table 3.

2. Polychlorinated biphenyls (PCB's) and phthalates - Individual grab samples were also collected at 4-hour intervals over both survey periods and deposited into a glass bottle, containing 50 ml of hexane as a preservative. The analyses are given in Table 3.

3. Total and Fecal Coliform Densities - A grab sample was collected from the Hurd Street discharge during the second survey. This sample was analyzed by the Michigan Department of Public Health Laboratory in Lansing. The result of this analysis is given in Table 3.

Table 1 Wastewater flow data obtained from the time-head curves supplied by the water level recorders installed on the wastewater outfall of Michigan Standard Alloys, Zinc Division.

First Survey Period: Started at 12:15 p.m., Monday, March 26, 1973 and Ended at 10:45 a.m., Tuesday, March 27, 1973.

Total Hours Monitored	22.55 hours
Actual gallons discharged	11,545
Average survey flow rate, MGD	0.012
Maximum discharge rate, MGD	0.054
Minimum discharge rate, MGD	0.000

Second Survey Period: Started at 11:00 a.m., Tuesday, March 27, 1973 and Ended at 9:15 a.m., Wednesday, March 28, 1973.

Total Hours Monitored	4.44 hours*
Actual gallons discharged	2,759
Average survey flow rate, MGD	0.015
Maximum discharge rate, MGD	0.032
Minimum discharge rate, MGD	0.001

* Recorder failed during the second survey period.

Table 2 Quantitative laboratory analyses of the composite wastewater samples collected from the discharge of Michigan Standard Alloys, Inc. into Ox Creek via the city storm sewer located on Milton Street in Benton Harbor. Also given is the daily loadings as pounds per day of selected constituents being discharged into Ox Creek during each survey period.

	First Survey Period March 26-27, 1973		Second Survey Period March 27-28, 1973	
Parameter	Conc.* mg/l	Load* lbs/day	Conc.* mg/l	Load* lbs/day
Chemical oxygen demand	16	1.6	35	4.3
Total solids	172	17	208	26
Total volatile solids	56	5.6	40	5
Dissolved solids	169	17	71	8.9
Dissolved volatile solids	56	5.6	26	3.2
Suspended solids	3	0.30	37	4.6
Suspended volatile solids	--	--	14	1.8
Total phosphates-P	0.05	0.005	0.07	0.009
Soluble orthophosphates-P	0.04	0.004	0.01	0.001
Organic nitrogen-N	0.16	0.016	0.40	0.05
Ammonia nitrogen-N	0.05	0.005	0.03	0.004
Nitrate nitrogen-N	0.29	0.029	0.33	0.04
Chlorides	18	1.8	18	2.3
Fluorides	1.6	0.16	1.8	0.23
Iron, Fe	0.35	0.035	0.45	0.06
Aluminum, Al	<0.5	0.05	0.70	0.09
Copper, Cu	0.01	0.001	0.70	0.09
Zinc, Zn	1.3	0.13	3.6	0.45
Chromium, Cr	<.01	0.0010	0.06	0.008
pH	7.7		8.2	
Mercury, Hg	<0.001	--	<0.001	--

Table 3 Quantitative laboratory analyses of the grab composite samples collected at the Hurd Street outfall of Michigan Standard Alloys, Inc., Zinc Division during the survey of March 1973.

Parameter	Hurd Street Outfall
Oil, as hexane extractables, mg/l	32 *
Polychlorinated biphenyls, ppb	18 **
Phthalates, ppb	<1 **
Total coliform density, counts/100 ml	1700 ***
Fecal coliform density, counts/100 ml	10 ***

* Second 24-hour survey composite only
** 48-hour composite sample
*** A single grab sample collected at 3:00 p.m., March 27, 1973

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